MAY 9 1990

I 29.2:N42/4

RESOURCE INVENTORY AND ANALYSIS

NEW RIVER GORGE NATIONAL RIVER
West Virginia

U.S. Department of the Interior / National Park Service

COMPLETED

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INTRODUCTION

This *Resource Inventory and Analysis* has been developed to communicate the information collected to date on the scenic, natural, cultural, and recreational resources of New River Gorge National River. Due to the differing types and availability of information, the development of significance levels for three of the four resource areas required a unique approach while roughly paralleling the others. Significance levels were not developed for scenic areas due to the difficulty in assigning significance based on landscape character. Each approach is described in the "significance" portion of each resource section and displayed on the accompanying maps.

The purpose of this project is to provide base information and initial analysis from which land use decisions can proceed. Because resource information is constantly being accumulated and updated, this data base has been designed as flexible as possible in order to remain responsive to changing conditions. The management and resource protection needs of the national river are dynamic and influenced by many external as well as internal factors. Computer mapping via Geographic Information Systems (GIS) of all known resources forms a data base that can be easily updated as new data become available. Information on scenic, natural, cultural, and recreational resources was plotted on 7-1/2 minute USGS topographic quads, transferred into digital data, and entered into the GIS data system. This data base and the qualitative analysis that derived the subjective resource values from 1 to 4 provide a starting point from which to generate the resource, development, and land acquisition decisions that occur in park management. As these decisions must also be influenced by new information and changing conditions that cannot be anticipated by this study, this study must serve as an introduction not a conclusion.

SCENIC RESOURCES

The analysis of scenic resources begins with an identification of landscape character from Hinton to the U.S. 19 bridge. The objective was to describe the overall image the visitor could be expected to receive from a visit to New River Gorge National River. A major concern that needs to be addressed is how additional development might affect the visitor's appreciation of these scenic resources. It is recognized that the evaluation of scenic resources can largely depend on a viewer's own perception, and thus is subjective in nature. For the purposes of this document, the perceptual attributes of land (image and character) are expressed in broad and generally acceptable terms. The term scenic resources encompasses not only natural landscape features, but also cultural elements – the unique patterns of land uses and built elements. Included in this inventory is a description of the types of land use as viewed from the river, overlooks, and primary roads.

PROCESS AND PARAMETERS

The process used in this identification and analysis considered view distance, landform features and topography, vegetative composition, and finally, the type, extent, and character of land uses within New River Gorge National River. A series of computer-generated maps indicating the viewshed or extent of lands visible from the river at regular intervals, from primary and secondary highways at regular intervals, and from existing viewpoints or scenic overlooks were created. These maps depict viewsheds from what are considered the areas of highest visitor use and prominent overlook points. They include land visible within 2 miles from each land-based point and 1 mile from each river point.

The topography of land, mainly its slope and aspect, influences the extent of land visible to the observer. Surface planes at 90 degrees, or facing directly perpendicular to the eye, are in full view. The topography near the national river is that of a greatly dissected plateau deeply cut by the New River. Scenic vistas are either from rim tops as panoramic views of the gorge or from within the gorge as enclosed views – a result of the steep gorge walls and meandering channel pattern of the river.

The type and extent of vegetation greatly affects what is visible. Deciduous vegetation has the ability to screen a variety of built elements during the "leaf on" season as long as the pattern of forest openings is maintained. Openings created in dense stands of vegetation are noticeably apparent. As an example, forested areas with natural openings that face away from the observer and are shallow-sloped could be said to accommodate and "absorb" some degree of development without being apparent to the observer.

The planning team has divided the national river into four units that characterize land use and pattern of development. These units are physically distinct.

Lower Gorge Unit (north boundary to Thurmond), a **natural** unit
Middle Gorge Unit (Thurmond to Quinnimont), a **rustic** unit
Glade Creek Unit (Quinnimont to Meadow Creek), a **natural** unit
Upper Gorge Unit (Meadow Creek to Hinton), a **rural** unit

The three terms used to describe landscape character – natural, rustic, and rural – are labels applied to broad areas of land that support different proportions of land uses.

Natural – Access to a major portion of the area is by foot, river, or primitive road. The land in the vicinity of the river is primarily forested, without the presence of contemporary communities, where the impression is one of a relatively uninhabited landscape. Natural features are the dominant elements of the landscape.

Rustic – Access to the area is by way of paved roads on secondary travel routes. The unit supports a few small communities consisting primarily of residential and commercial land uses. The unit expresses a character of "country" living by its inhabitants and lacks the variety and commercialization often found in larger, full service towns.

Rural – Access to the area is by a variety of primary and secondary paved roads. The communities are larger and offer a wider range of commercial activities and amenities. Land uses, including residential, commercial, agricultural, and light industrial, are perceptibly dominant in the vicinity of the river.

SETTING

The physiographic setting of New River Gorge National River is essentially a 50-mile- long trough dissecting the Allegheny Plateau and averaging 1,000 feet deep. Beginning at the south end near the town of Hinton and continuing to the settlement of Meadow Creek, the gorge is a mile or so wide and forested with areas of dispersed residential and agricultural uses. A predominantly natural forested landscape lies north of Meadow Creek to a loosely knit, small commercial and residential area at Prince and Quinnimont. Farther north the scene changes to undeveloped forested areas with a few scattered residential and recreational sites until one reaches Thurmond. North of Thurmond the gorge has the least contemporary development, and the river begins its widest stretch within the national river boundary.

UNIT DESCRIPTION

The following section provides a detailed description of each unit and includes broad visual objectives that could be considered in management of the scenic resources. These objectives are intended to address the issue of compatibility, i.e., whether or not a particular component fits into the overall image of each unit. Without a more detailed inventory and evaluation of all built elements in each unit, specific compatibility issues related to particular parcels of land cannot be addressed at this time.

Upper Gorge Unit (From Hinton to Meadow Creek) – Rural

The landform from Hinton to Meadow Creek consists primarily of rolling hills with 30 to 60 percent slopes and many stream drainages and creeks. A substantial portion of the land area faces away from the New River and toward these secondary drainages. This stretch of the river also exhibits the most abundant island and bottomland area within the national river boundary. Consequently, these flat areas display the most evidence of human settlement.

Physical and visual access to this unit is relatively high and is expected to increase. The existing primary and secondary roads paralleling the river are/will be augmented by the new

I-64 crossing of the gorge at Sandstone and the proposed New River Parkway, planned to link I-64 with Hinton and beyond. Current scenic opportunities afforded by the roads offer views from river level to elevations halfway up the valley sides.

In Hinton, the older architecture and symmetrical rooflines of the homes (viewed from across the river) give it a small-town atmosphere. The core of Hinton has retained its small-town, historical ambience, whereas the outskirts show the beginnings of strip development and commercial chain establishments lacking any continuity in design.

Industrial, commercial, and residential land uses are prominent. As one passes through Hinton, the development gradually thins out into open agricultural and pastoral land use interspersed with residential use. The wide valley with its undulating topography (gentler than the steep gorge walls downriver) forms a pastoral pattern of rural variety. Architecture and site furnishings express a variety of historic and contemporary origin. Views across the valley and from road overlooks display the rural character of the settlement pattern. There is variety in the vegetation pattern as agricultural and ornamental plantings are intermixed with the natural forested landscape. Slopes are shallower than other portions of the park, and there are areas where the land aspect orients away from the river. The composition of land uses differs from each viewpoint. Especially significant is the fact that this pastoral scene will be viewed from the proposed New River Parkway and the I-64 bridge. Progressing downriver, with the exception of the small settlements at Sandstone and Meadow Creek and an abandoned coal conveyor at Claremont, the valley appears less developed and begins to narrow as the gorge sides begin to rise.

The visual quality objective for this unit should be the broadest of the four units. Scenic opportunities exist for broad panoramic vistas of the river gorge from superior vantage positions. Focal views upriver and downriver are framed by rolling valley sides when observed from river level. Key natural features include Brooks Falls, Sandstone Falls, and the Sandstone Cliffs on River Road.

Glade Creek Unit (Between Meadow Creek and Quinnimont) – Natural

The valley sides between Meadow Creek and Quinnimont average 50 to 60 percent in slope. The topography is actually no steeper than the Upper Gorge unit to the south, but the range of grades is narrower. There are fewer secondary tributaries so a greater portion of the land aspect is oriented toward the New River.

Because access to the river between Meadow Creek and Quinnimont is limited, most riverside use involves hiking, fishing, and camping. The views from the river are of sweeping forested slopes stretching back through the ravines to the ridgetops. The most panoramic views of the gorge are from Grandview State Park, perched at the head of McCreery Hollow. One overlook predominantly faces the portion of New River from Quinnimont and across Backus Mountain and up the gorge to the area just north of Meadow Creek. It offers distant views up and down the river where this segment of the gorge is displayed as a relatively uninhabited, natural forested landscape, and access is attained only by way of water, foot, or rail.

The visual quality objective is to retain what is essentially a natural forested landscape supporting only the railroad, Grandview State Park on the rim, and the traverse of upper Glade Creek by I-64 as development. Access into the unit is provided by river or trail.

Middle Gorge Unit (From Quinnimont to Thurmond) – Rustic

The topography from Quinnimont to Thurmond has the same essential character of the Glade Creek unit, with 50 to 60 percent slopes and a few secondary tributaries that accommodate paved highways and railroad branch lines.

Upon approaching Quinnimont, Prince, McCreery, and Terry, human presence becomes increasingly evident along the riverbanks. This historic settlement area has grown up along developing transportation corridors – first the river, then the railroads, and only slightly later, the highway, West Virginia Route 41. In keeping with the historical development patterns of these settlement areas, the buildings are quite small in scale (one or two stories), and most were built with local, unfinished materials that lend an element of casualness. As some of the original businesses of the settlements have dwindled (from the decline in mining and logging), more recreational and commercial ventures have evolved. These include camping, fishing, and river rafting operations. The small businesses and associated residential developments are clustered closely along the riverbanks as the gorge narrows here to about half the width exhibited at Hinton.

From a high vantage point in Grandview State Park, the north overlook orients toward a panoramic view of Prince, Terry, and the large meander known as Stretcher Neck. The gorge walls rise steeply in a relatively unbroken expanse of forested folds from behind the valley settlements to the crest of the ridges. An electric transmission line with a large cleared right-of-way bisects the forested face of the ridge above Prince, and a few former strip mines are visible on distant ridgetops. There are some scattered houses and pockets of concentrated, small-scale residential and local commercial development within these views.

Scenic opportunities primarily include enclosed views within the meandering channel pattern of the river from the principal through-highway Route 41 and secondary roads to Terry, McCreery, and Thayer.

Between Stretcher Neck and Thurmond there are remnants of numerous mining and logging towns. McCreery and Thayer are the most visible communities, retaining current inhabitants, but they possess only primitive road access. The scenic nature of this stretch is a predominantly undeveloped, forested gorge with cliff faces near the top of the gorge walls. The remaining evidence of human settlement is quite dispersed, small in scale, and rustic.

Thurmond is a major visual break in the densely forested landscape. This historic community has high visibility because of its remaining buildings and growing recreational use. The railroad yard area, abandoned commercial structures, and few residential homes all combine to give Thurmond a "sense of place" between the river and the gorge wall, which rises precipitously behind the town. Thurmond is configured in such a way that it has a pedestrian scale at the end of a paved road from Glen Jean with the railroad mainline as its "main street." The Minden Trail, overlooking the town from across the river, provides selected vistas through unobtrusive forested openings.

The visual quality objective is to maintain the rustic character of the landscape – primarily natural, with pockets of residential clusters. The scale of development is small, and the communities reflect a sense of prominence and activity long passed.

Lower Gorge Unit (From Thurmond to North Boundary) – Natural

The topography from Thurmond to the park boundary north of US 19 has the steepest gorge walls within the national river boundary, with slopes averaging between 50 and 80 percent. This segment possesses the least number of tributaries, leaving most of the land below the rim orienting directly toward the river.

This remaining stretch of gorge is the most remote and undeveloped. The only obvious built-up areas (aside from continuing railroad use) are old mines and coal towns that are slowly succumbing to natural processes. This stretch also has the most exciting passages of white water for river rafting. Access to most of this segment is limited, except for Canyon Rim where US 19 provides access to rim overlooks and river access roads. The views from US 19 while crossing the New River bridge are screened to an extent by the bridge's guardrails. Beauty Mountain to the south of Canyon Rim and Babcock State Park where the trail down to Sewell begins offer other opportunities to view the gorge from the rim.

The visual quality objective is to maintain the unit's natural image. The wild character of the river, the steep gorge walls, and the vertical cliffs at the rim contribute to an awareness of the forces of nature in a relatively uninhabited segment of the river gorge. The abandoned communities of Sewell, Beury, and Kaymoor augment the visitor's understanding of the role coal played during America's steam era.

SCENIC VIEWSHEDS

Two sets of viewshed maps were computer-generated from a series of selected points. Three different categories of viewshed points, differentiated by the type and level of visitor access (pedestrian, boat, or vehicular), were assigned and plotted. It should be noted that for purposes of speeding computer time the viewsheds of the river and roads were composited from a series of points at .5- to 1-mile intervals rather than a continuous string. While this reculted in apparent "gaps" on the accompanying maps, the general extent of visible land is delineated, and additional points will need to be run to depict a more accurate viewshed.

One set of overlay maps were developed that plotted in red the composite viewshed of all chosen points. A second set of maps was plotted to demonstrate an application of the GIS technology whereby a group of points under a particular criteria were extracted from the data base and mapped. The following are three groups of viewsheds that were mapped and the associated criteria for each.

Viewshed Type X

These are areas where a high number of visitors are expected to visit and unique features are present. This includes overlooks and locations from the river where the natural landscape character is dominant. The following list of viewsheds are considered type X and are depicted in red:

- Sandstone Falls overlook from Highway 20
  Views to falls from a cleared vista

- Canyon Rim overlooks
  View natural scene of river gorge

- Grandview State Park overlooks
  Broad panoramic views of natural and rustic scene

- From river, Thurmond to north boundary
  Foreground views in natural Lower Gorge unit

- From river, Meadow Creek to Quinnimont
  Foreground views in natural Glade Creek unit

Viewshed Type Y

These are areas within viewsheds of secondary roads or from the river in the rustic Middle Gorge unit. The following list of viewsheds are considered type Y and are depicted in brown:

- From river, Quinnimont to Thurmond
  Foreground enclosed views of rustic Middle Gorge unit

- Highway 26, Hinton to I-64
  Corridor of proposed New River Parkway

- Highway 25, Glen Jean to Thurmond and Stone Cliff
  Foreground enclosed and canopy views down Dunloup Creek

- Highway 7, from Meadow Creek to Meadow Bridge

- County Road 85, vicinity of Beauty Mountain
  Undeveloped overlooks from secondary road

Viewshed Type Z

These are viewsheds of primary and secondary roads traveled at relatively high speeds and the viewshed from the river in the rural, more developed Upper Gorge unit. The following list of viewsheds are considered type Z and are depicted in blue:

- I-64, crossing upper Glade Creek and New River at Sandstone

- Highway 41, crossing the gorge at Prince and Quinnimont

- Highway 20, east side of river from Hinton to Meadow Creek

- From river, Hinton to Meadow Creek

NATURAL RESOURCES

The enabling legislation (Public Law 95-625) recognizes and provides for the protection and preservation of the natural resources in New River Gorge National River. Specifically, the act states the following:

> For the purpose of conserving and interpreting outstanding, natural, scenic and historic values and objects in and around the New River Gorge and preserving as a free-flowing stream an important segment of the New River in West Virginia for the benefit and enjoyment of present and future generations, the Secretary shall administer, protect, and develop the national river in accordance with the provisions of the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1 et seq.) as amended and supplemented; except that any other statutory authority available to the Secretary for the preservation and management of natural resources may be utilized to the extent he finds such authority will further the purposes of this title.

This section provides a general description of the natural resources and identifies significant resources and resource issues. The natural resource information base included rare, threatened, and endangered plant and animal species, wetlands, stocked streams, unique habitats, and peregrine falcon hacking sites. This information was then combined in the computer with cultural, recreational, and scenic information and printed out as resource data overlays for use with 7-1/2 minute USGS topographic quads.

These areas were also rated as to their significance using the same scale as cultural and recreational resources. Because our management policies and certain legislation requires the National Park Service to protect rare, threatened, and endangered species and unique habitats, these resources were all given a significance level 1 rating. Stocked streams were rated at significance level 3 (locally significant).

FISHERIES AND RIPARIAN HABITAT

Description

The New River and its tributaries comprise the largest and most significant warm-water fishery in the state. Its flow gradient and bottom type provide good spawning areas, while riffles and pools supply excellent habitat for a variety of fish. The river has good instream and riparian cover characteristics, further contributing to fish habitat quality. The New River supports and maintains game fish populations of largemouth bass, smallmouth bass, catfish, muskellunge, walleye, crappie, sunfish, and spotted bass. The entire river is identified as existing or potential spawning grounds. A total of 58 species of fish have been identified in New River, and 5 are considered endemic – *Nocomis platyrhyncus* (bigmouth chub), *Notropis scabriceps* (New River shiner), *Phenacobius teretulus* (Kanawha minnow), *Etheostoma kanawhae* (Kanawha darter), and *Etheostoma osburni* (finescale saddled darter). *Percina maculata* (blackside darter) has been recognized as endemic but not yet described.

Because the tributaries in the New River basin are not able to support a fishery, the West Virginia State Department of Natural Resources runs a stocking program. The program consists of put-and-take trout stockings in the neutral streams that will support trout for

most of the spring and summer. The streams, which are stocked with adult brook trout, rainbow trout, and some brown trout, currently include Wolf Creek, Glade Creek of Mann's Creek within Babcock State Park boundary, Dunloup Creek, Glade Creek, Pinch Creek of Glade Creek, and Meadow Creek. The park staff believes that Glade Creek within Raleigh County has the potential to maintain its own fishery. The above streams are identified on the accompanying maps.

Significant Resources

The U.S. Fish and Wildlife Service classified the New River Gorge and its associated aquatic, wetland, and riparian habitat as category 1, in accordance with its "Mitigation Policy" of 1981. Habitats given this designation are considered to be of high value for evaluation species and are unique and irreplaceable on a national basis or in the ecoregion section.

Recent biological surveys of the riparian wildlife, fish, and freshwater mussels of the New River Gorge National River identified the backwater channels and islands located just downstream of the town of Hinton as critical habitat (Jirka 1986; Buhlmann 1986). It is the only area that contains living individuals of all seven species of freshwater mussels known to occur in the national river. In addition, this area contains the largest of three colonies of *Pseudemys concina* (eastern river cooter turtles) within the national river. River cooter turtles occur primarily on the coastal plain and piedmont of the southeastern United States. Populations of this turtle in the New River are isolated and may represent Pleistocene relicts. The West Virginia Department of Natural Resources lists this turtle as a species of special concern. The backwater channel has been identified as the site of Hinton's new sewage treatment plant. This area is identified on the accompanying maps.

Significant Resource Issues

Based on conversations with park staff and officials of the West Virginia Department of Natural Resources, the fisheries and riparian habitat appear to be in good health. However, detailed surveys and studies of the riparian habitat are not available. Water quality is an issue at New River and could potentially threaten the wildlife and riparian species in the New River gorge area. Destruction of habitat not yet identified could also potentially threaten the wildlife and riparian species.

WILDLIFE

Description

With a few exceptions, not much is known about the wildlife of the New River Gorge National River, especially the presence of critical wildlife habitat and endangered, threatened, rare, or sensitive species.

The forests support healthy populations of wildlife species. In wooded habitats white-tailed deer, gray squirrel, fox squirrel, raccoon, opossum, skunk, fox, and various small rodents are the most common mammals. Black bears have been sighted in the past, and evidence indicates they may be increasing in numbers.

The gorge supports many species of birds, such as belted kingfisher, catbird, swifts, sparrow hawk, blackbird, crow, and dove, which are prominent year-round.

Open lands support healthy populations of groundhog, rabbit, and other common animals. Streamsides provide habitat for such riparian species as muskrat, mink, raccoon, and beaver.

Many reptiles and amphibians are also common. Spring peeper, American toad, and green frog are common representatives of the *Ranidae*, while box, stinkpot, and snapping are the most common turtles. Numerous snake species inhabit the area, including timber rattlers and copperheads.

Significant Resources

Conversations with the U.S. Fish and Wildlife Service revealed that many species of salamander occur in the gorge, including the blackbellied and green salamanders that are rare in West Virginia. *Aneides aeneus* (green salamander) is listed under category 2 (*Federal Register*, Vol. 50, No. 181) by the U.S. Fish and Wildlife Service as proposed for endangered or threatened species status.

In 1987 the Department of Natural Resources in cooperation with the National Park Service, U.S. Fish and Wildlife Service, and the Peregrine Fund reintroduced the peregrine falcon (*falco peregrinus*) into the New River Gorge National River. The peregrine falcon is listed as an endangered species by the U.S. Fish and Wildlife Service. Three birds were initially released in 1987; one did not survive. Six birds were scheduled to be released in 1988. The U.S. Fish and Wildlife Service and West Virginia Department of Natural Resources have identified the entire gorge as good habitat for peregrine falcon because of an adequate food supply, suitable nesting sites, and proximity to water. However, the gorge has not been designated by the U.S. Fish and Wildlife as critical habitat. All cliffs in the gorge were determined to be suitable nesting sites. There are many birds within the national river that could provide an ample food supply for the peregrine, and water is readily available. The hacking site (nesting site) is identified on the accompanying maps.

The approximate 100 mining complexes within the national river boundary with multiple openings serve as habitat for various species of bats. All of these have not been surveyed to determine if rare bat species inhabit the area. However, two species of bats on the federal list of endangered species – the Indiana bat (*Myotis sodalis*) and the Virginia big-eared bat (*Plecotus townsendii virginianus*) have been found in abandoned mine portals in neighboring states. The U.S. Fish and Wildlife Service officials believe that New River Gorge National River offers excellent habitat for these endangered species. A complete survey of all mine portals needs to be completed.

Based on a bat habitat study contracted by the West Virginia Department of Natural Resources and the National Park Service that evaluated 14 mine portals the Park Service had proposed for closure, five portals were determined to be suitable habitat for bats and other species listed under category 2 (*Federal Register*, Vol. 50, No. 181). These were *Aneides aeneus* (green salamander), *Myotis subulatus leibii* (eastern small-footed bat), *Plecotus rafinesquei* (southeastern big-eared bat), *Myotis septentrionalis* (Keen's bat), and *Neotoma floridana magister* (wood rat).

Significant Resource Issues

Wildlife could be threatened by poor water quality and destruction of habitat from development and herbicide spraying conducted by utility, railroad, telephone, or highway maintenance crews.

GEOLOGY

Description

According to geological records, the New, Gauley, and Kanawha rivers are remnants of an ancient watercourse called the Teays River. The present New River was the main headwaters of the Teays River.

More than 200 million years ago, during the late Paleozoic era, the eastern and central parts of the United States were beneath a sea. Towards the end of the Paleozoic era the sea bottom was uplifted and the Appalachian Mountains appeared. Early in the Mesozoic era the Appalachians were probably higher than the present-day Rocky Mountains; however, through erosion they were worn down to a nearly level plain. The Teays River accomplished much of that erosion flowing westward to a large inland sea that covered much of the central part of what is now North America.

At the beginning of the Cenozoic era, about 60 million years ago, there was another broad land uplift, which caused the inland sea to drain away except for an arm that extended north from the present-day Gulf of Mexico to southern Illinois. The Teays River was also uplifted causing its gradient to steepen, but it maintained the same course as it eroded through the uplifted rock layers. The deep canyons, winding course, and nearly vertical walls of the gorge are the result of the New River's erosion since the first Appalachian uplift.

Significant Resources

The New River is significant because it is now the only stream that flows northwestward across the Appalachians. As the New River flows north, the average elevation of the ridges above it decreases and the rocks dip northward. Thus, the New River gradually drops 750 feet in elevation between Hinton (at the south end) and Gauley Bridge (at the north end above the boundary of the New River Gorge National River). It averages a drop in elevation of 12 feet per mile.

The rocks in New River Gorge are sedimentary formations that were deposited during the Mississippian and Pennsylvanian periods of the Paleozoic era. They range in age from 340 to 280 million years old. The older Mississippian strata dominates the upper gorge between Hinton and Meadow Creek. Below Thurmond both the gorge and adjacent ridges are composed of Pennsylvanian rocks. The major formations within these two groups of rocks are named Hinton and Bluestone (Mississippian) and Pocahontas, New River, and Kanawha (Pennsylvanian). It is unusual for a river to flow from an older formation onto a younger one.

The Hinton and Bluestone formations are primarily shale and siltstones. The Pocahontas and New River formations are complexes of sandstone interbedded with siltstone, shale,

and coal. The New River formation contains the quartzose conglomeratic sandstone, which formed the cliffs of the deep gorge, and also contains the Fire Creek and Sewell coal beds, the most important coal strata in the immediate gorge area. The Kanawha formation, which dominates the lower gorge above Hawks Nest, contains less sandstone and more shale, but is otherwise similar to the preceding rock series.

Significant Resource Issues

At this time there are no known significant resource issues related to the geology of New River Gorge.

SOILS

Description

Soils within the national river boundary are moderately deep silty or sandy loams, usually well-drained, and very stony. Most of the soils lie on very steep (40 to 70 percent) slopes. They are of low or moderate fertility and generally unsuited for crops or pasture except in limited areas of gentle slope as found in the southern end of the gorge.

Derived from shale and siltstone, the Calvin-Gilpin association dominates the river basin in the areas between Hinton and the Meadow Creek area. They are moderately fertile and well-suited for tree growth, but have severe erosion potential when deforestized. Because of steepness, stoniness, and relatively shallow bedrock, their engineering limitations are severe.

The Calvin-Gilpin soils continue to dominate the valley bottom and lower slopes in the area between Meadow Creek and Claremont. The upper slopes, ridgetops, and tributaries contain the Steep Rockland-Dekalb-Gilpin soils. Steep Rockland refers to areas of massive sandstone outcrops and broken cliffs, 1 foot high to over 50 feet high, found along the rims of the gorge. Dekalb soils are rocky, brown sandy loams (derived from sandstone) that occupy the gorge walls and many of the ridgetops. These soils are permeable and rather droughty, with a slight erosion hazard. They have the same engineering limitations as Calvin-Gilpin soils and are equally well-suited for timber growth.

The gorge is dominated entirely by the Steep Rockland-Dekalb-Gilpin association between Claremont and the lower national river boundary. The most common bank soils are very stony silt loams of the Earnest series, which are moderately fertile colluvial soils limited by seasonally high water tables.

Significant Resources

There are no prime agricultural lands or unconsolidated beaches within the national river boundary.

Significant Resource Issues

The New River Gorge area has severe soil limitations for development. Because of steep slopes, rocky soil, and erosion hazard, soils at possible building or other development sites should be carefully evaluated.

VEGETATION

Description

New River and its tributaries are part of the mixed mesophytic forest region (Braun 1950) of central Appalachia, characterized by a dense growth of deciduous trees and shrubs. Although stand compositions vary from site to site depending on slope, exposure, depth of soil, and disturbance history, the most common trees include species of the red and white oak groups, basswood, tulip poplar, sugar maple, buckeye, beech, hickory, and hemlock. Virginia and shortleaf pines are common on drier sites and recently disturbed areas, while the river edges support elm, silver or red maple, and sweet gum species. Frequent associates include white ash, cucumber magnolia, and sour gum. An even greater variety of low trees and shrubs such as dogwood, redbud, witch hazel, magnolia, persimmon, and rhododendron adds to the complexity of this vegetation. The herbaceous flora of the area is also rich and abundant. There is a vegetation map in the GIS data base that identifies 29 different vegetation types within the New River Gorge National River.

The topographic diversity of the gorge has led to the development of an unusual variation of flora, including species with northern or southern affinities and disjunct populations of plants from other regions. The gorge serves as a distributional corridor for plants between the eastern coastal plains and the Mississippi Valley, and contains plants common in either or both of those regions but uncommon elsewhere in the central Appalachians.

Significant Resources

Based on information obtained from the U.S. Fish and Wildlife Service and park staff, *Trifolium stoloniferum* (running buffalo clover) is on the federal list of endangered species. The plant species has been found near McKendree, a site owned by the National Park Service.

The state of West Virginia does not maintain a legally designated list of rare or endangered species; however, the Department of Natural Resources does maintain a list of species of special concern under the West Virginia Natural Heritage Program. A rare vascular plant survey completed in 1986 identified 22 sites within the New River Gorge National River as supporting rare plants. A total of 36 rare plant species were identified; two species are believed to be "globally rare plants" (100 or fewer occurrences in the world), and six species are known to occur only in the national river within the state of West Virginia. The 22 sites have been identified and are shown on the accompanying maps.

Two of the rare plant species found in the national river boundary that are believed to be globally rare are *Thalictrum steeleanum* (Steel's meadow rue) and *Cardamine clematitis* (Mountain bitter cress). *Thalictrum steeleanum* is listed under category 2 (*Federal Register*, Vol. 50, No. 181). This category signifies that the species listed are undergoing a review

process and are being considered as additions to the federal list of endangered and threatened species.

Thalictrum steeleanum has been found at three sites within the national river boundary – Claremont East, Stretcher Neck South, and Terry East. The populations at Claremont East and Stretcher Neck South are near a road and power line right-of-way, and could be threatened by routine maintenance performed on the road and power line right- of-way. The utility companies also spray herbicides along these rights-of-way, which could seriously threaten this plant population.

New River Gorge National River supports habitat that appears to be preferred by *Thalictrum steeleanum*, i.e., well-drained, wooded slopes with a relatively open understory, so potentially more populations of this species could be found or reintroduced here.

Cardamine clematitis is a southern Appalachian endemic and reaches its northern limit in West Virginia, and is found only in the New River Gorge. It has been identified at Camp Brookside, Stretcher Neck Army Camp, Stretcher Neck North, Terry East, and Stonecliff West (two occurrences). The plants at Stonecliff West are located near a dirt road that begins at the Stonecliff Bridge and follows the river for several miles south. These populations could be threatened by road improvements, heavy vehicle use of the road, or herbicide spraying conducted by state or county road maintenance crews.

New River Gorge National River also supports habitat that *Cardamine clematitis* appears to prefer, i.e., rich mesic-forested floodplains. The potential for this species to further populate the gorge is good.

The rare vascular plant survey also identified a unique habitat community called the Appalachian River Flatrock community. Currently, five areas have been identified in West Virginia, three of which lie within the national river boundary. These areas represent riverside exposures of parent rock and were formed when the river intersected with the massive, nearly flat sandstone strata. Long-term scouring by the river produced large, horizontal exposures of these resistant beds. These areas provide the type of habitat that supports rare plant species. The three areas within the national river are as follows (also see accompanying map):

Keeney Creek-Flatrock – Located in the northern part of the gorge, this site supports six rare plant species populations. These plant populations could be threatened by maintenance occurring along the railroad track that follows the east side of the site.

Camp Brookside – Located next to the river at Brooks Falls, this site supports the largest known concentration of rare plant species within the national river boundary. It is one of the best examples of an Appalachian River Flatrock community. This site is privately owned and has been used as a fishing camp, and with this type of use both the rare plants and the habitat community have been afforded some protection.

Sandstone Falls – Located next to the river at Sandstone Falls, this relatively large site supports three rare plant species. There is significant impact on this site from historical grazing and unrestricted, heavy recreational use.

Significant Resource Issues

According to reports and surveys prepared by the West Virginia Department of Natural Resources in cooperation with the National Park Service, some of the unique habitat communities and a few of the rare and endangered plant sites are in high visitor use areas, potential visitor use areas, and along rights-of-way for railroad and utility companies. These are potentially threatened by herbicide spraying, maintenance, construction, and trampling.

WETLANDS

Description/Significant Resources

To date, only one wetland has been identified in New River Gorge National River. Located in the Glade Creek area in Raleigh County, it is known as the Kates Branch wetland and contains the following rare plants as determined by a survey conducted by the Department of Natural Resources and the National Park Service: (*Calopogon pulchellus* (grass pink orchid), *Carex stylollexa* (sedge), and *Pogonia ophioglossoides* (rose pogonia). These plants are included on the state's species of special concern list. The Kates Branch wetland area is identified on the accompanying map.

Significant Resource Issues

There are no known significant resource issues concerning the Kates Branch wetland area in New River Gorge.

WATER QUALITY

Description/Significant Resources

Water quality has been monitored throughout the gorge since 1980. From 1980 to 1984 the National Park Service and the West Virginia Department of Natural Resources monitored several locations quarterly. These areas were sampled for multiple parameters (metals, nutrients, and bacteria). This program identified a need for further monitoring, particularly of fecal coliform bacteria. During 1985 and 1986, NPS personnel sampled selected locations in the New River Gorge National River for fecal coliform analysis. These samples reflected values well in excess of the West Virginia criterion of 200 counts per 100 milliliters for water contact recreation. During both years sampling was conducted at times considered as the water contact season.

In 1987 the National Park Service and the Department of Natural Resources entered into a cooperative agreement to conduct further studies on fecal coliform levels. This involved sampling five times per month for six months (April-September) at 14 locations (nine on the river and five on tributaries). At sites located on the New River, with one exception, the West Virginia criterion was exceeded only during the months of April and May (high water). The criterion was violated during all months of the study at a site located a short distance downstream from the Hinton sewage treatment plant. From the tributaries sampled, fecal coliform levels exhibited seasonal patterns similar to those from the New River sites (higher values during periods of high water). However, at Piney Creek, values were higher

in magnitude compared to the other sites. This is indicative of a continuous source of fecal contamination supplemented by nonpoint source inputs.

Significant Resource Issues

The lack of adequate sewage treatment facilities for communities within and adjacent to the New River Gorge National River is resulting in state violations of water quality standards in the river and its tributaries. In some cases, raw sewage is leaching into the river. Because the New River supports many different recreational uses that bring people in direct contact with the water, this problem must be addressed.

With the development of I-64, water quality problems are anticipated at Glade Creek. Oil, gas, and road salts from highway runoff are a concern.

Other types of water pollution, such as from abandoned mine drainages, industrial wastes, and sedimentation from construction projects and logging operations, could potentially become a problem within the national river boundary.

SOLID WASTES

Description/Significant Resources

Traditionally, roadside dumping of solid wastes has occurred along embankments within and surrounding New River Gorge.

Significant Resource Issues

The three counties within the boundary do not have adequate solid waste disposal programs. They do maintain a small number of landfills, but these are widely scattered. Collections are made by private contractors who do not provide service to many rural households, which are charged a fee for using the landfill. According to the park's resource management plan, a significant amount of solid waste has been deposited on private lands within the boundary. Large amounts of solid waste have the potential to adversely affect groundwater resources and water quality in the New River and its tributaries.

STUDIES NEEDED

- Conduct resource base inventory that will include the following:
  - Mammal survey
  - Groundwater survey
  - Black bear survey to determine population and habitat areas
- Survey mine openings to determine which ones are being used as bat or other animal habitat and which ones are not
- Conduct air quality study
- Conduct acid precipitation study

- Conduct water quality study that identifies point and nonpoint sources of water pollution; develop a recommendation that is economically and environmentally feasible to solve the water quality problem of New River
- Study areas currently sprayed by railroad and utility companies to identify impacts
- Survey abandoned mining operations; locate and map "gob piles" and areas where leaching may be occurring; identify impacts and develop proposal to address this issue
- Conduct exotic plant survey
- Monitor impacts of the West Virginia Department of Natural Resources black fly control program
- Conduct rare fauna species and habitat survey
- Conduct hazardous materials survey of industrial/cultural sites
- Conduct instream flow study to determine water releases required for preservation of natural aquatic ecosystems
- Establish and maintain criteria pollutant baseline monitoring program
- Study New River as a bird migration route
- Inventory aquatic and terrestrial invertebrates of New River Gorge
- Identify location of significant fossils in New River Gorge
- Develop a backcountry management plan

CULTURAL RESOURCES

A limited literature search was conducted to identify New River's cultural resources. A report entitled *A Cultural Research Project: The New River Gorge National River, West Virginia* (Marshall & Associates 1981) was the primary source of information. The report provided a general prehistorical and historical framework for further study. It identified and documented archeological and historic sites within park boundaries. The park's visitor and interpretive specialist was consulted about the sites in general, as well as some areas of historical activity that are relatively inaccessible.

DESCRIPTION

Cultural resources in the New River Gorge area are identified with the human use and settlement of the land. Many are remnants of the native Americans' passing, as well as large-scale industrial remains and once-thriving communities. Extant resources speak to the pattern of land use in and around the gorge.

The New River was and is a corridor that linked the Ohio Valley to Virginia and destinations south. Portions of Indian trails passed through the area. During the late 1600s the Iroquois moved through on their forays against the Cherokee and Catawba. Primary trails crossed in the gorge area, the most prominent being the Midland and Paint Creek trails, but did not follow the New River itself because of the natural obstacles. Secondary trails also crossed, fording the river at different places, including at Thurmond, Sewell, Prince, Meadow Creek, and Sandstone. Indian rock-shelters and camps are scattered throughout the area. There have been 248 sites identified within the park boundary, as well as 30 nearby sites for context. The locations of these sites have not been revealed publicly in an attempt to protect them, but they have been investigated and mapped as part of the Marshall & Associates 1981 study. Much more research remains to be done to establish a history of Indian use of the gorge.

Europeans began serious exploration of the area as early as 1671, but the first settlement in the gorge did not occur until 1798, at Bowyers Ferry, later known as Sewell. Roads and related development were slow in coming to the rugged gorge area. Early settlers, mostly of English, German, and Scotch-Irish heritage, followed the James River and Kanawha Turnpike on the north, and the Giles-Fayette-Kanawha Turnpike to the south, and settled in valley floor communities, in hollows and glens, and later on the ridges and plateaus. The earliest road crossing the New River started at Fayetteville and joined the river at Bowyers Ferry near Manns Creek. By 1889 another road crossed the river on a truss bridge at Fayette Station. The extant bridge has potential eligibility for listing on the National Register of Historic Places. Settlements grew near early turnpikes, ferries, or industries such as gristmills or sawmills. Sewell, Glade and Hamlet, Meadow Creek, Sandstone, Brooks, and Barkadale all thrived on agriculture, timbering, or quarrying.

The major period of European settlement began after 1873 when the Chesapeake & Ohio Railroad mainline was completed through the gorge on the north side, opening it to extensive coal and timber exploitation. The Stretcher Neck Tunnel was completed in 1872, and the railroad soon added another mainline for a few miles on the south of the river. Quinnimont, established in 1873 by Col. Joseph L. Beury, was the first railroad shipping point and the location of the earliest coal extraction and coke making. C&O branch lines were built to access mines along the various New River tributaries; these include Dunloup

Creek, Keeney Creek, Arbuckle Creek, Laurel Creek, and Piney Creek branches. The arrival of the railroad spurred other businesses, including commercial efforts in towns such as Prince, where the Prince Store is listed on the National Register. Several towns featured sawmills to provide timber for mining and construction. Subsistence farming, practiced by the earliest pioneers, soon grew into modern agriculture.

New River "smokeless" coal was nationally known for its high quality and low cost. West Virginia bituminous coal fueled the furnaces and steamships of America, and coal from New River was both pure and abundant. The coming of the C&O Railroad into the New River field made access to the coal possible. Railroad cars were filled with coal at the mines and coke at the coke ovens along the spur lines, and made into trains for shipment east and west.

Hinton and Thurmond grew as railroad centers with depots, train yards, and other railroad-servicing facilities. Both towns are listed on the National Register as historic districts. The C&O Railroad served many mining communities along the New River and its tributaries. These included Kaymoor, Brown, Nuttallburg, Elverton, Capertown, South Capertown, Brooklyn, Claremont, Fire Creek, Stonecliff, Red Ash, Rush Run, Beury, Concho, Erskine, Thayer, and Royal. A miners' hospital was built at McKendree to provide care for the region's coal workers. Patients came in by rail for treatment.

Architectural resources are abundant in the gorge area. Pioneer housing was followed by lumber camps, coal towns, and associated mining and railroad structures. Several sites in and around the gorge have potential National Register significance for their architectural or industrial qualities, including Thayer, Irish Mountain, Kaymoor, Nuttallburg, and Sewell.

The New River area was characterized by agriculture and booming coal mining, railroading, and logging industries until after World War II. By the 1960s many of the communities within the gorge were abandoned and their inhabitants scattered. Extant cultural resources reflect the human use, settlement, and exploitation of the New River and its associated landforms.

SIGNIFICANT RESOURCES

Significant or potentially significant cultural resources are those listed on, nominated to, or potentially eligible for nomination to the National Register of Historic Places. Significance level 1 cultural resources are those listed on the National Register; significance level 3 cultural resources are those nominated to or potentially eligible for nomination to the National Register as they may possess at least local significance; and significance level 4 cultural resources require further study to determine their significance. Currently, there are no identified significance level 2 cultural resources, which are resources determined to possess state significance. These were plotted by GIS, as well as other cultural resources illustrating the history of New River Gorge. The resources include designations for coal mining and associated mining and processing equipment, coal towns, railroad towns, railroads, industry, sawmills, agriculture, and quarries. Archeological sites were not mapped in the GIS data base in order to provide protection for them.

SIGNIFICANT RESOURCE ISSUES

The full extent of cultural resources in the park is unknown, and the historical significance of many communities and industrial areas is undetermined. A comprehensive cultural resources survey needs to be conducted to determine the significance of these resources and what protection measures will be necessary. Survey results would also be invaluable in the planning and decision-making process, e.g., determining visitor use areas and cultural resource interpretive programs.

STUDIES NEEDED

New River Gorge National River needs the most basic historic, architectural, and cultural landscape research, inventory, and evaluation work. As recommended in the Mid-Atlantic Region's recent operations evaluation, such work should be scheduled and programmed and include the following:

- definition of historic/architectural/archeological contexts
- development of essential contexts
- survey and inventory work in areas of development or heavy use of particularly fragile resources
- nomination/determination of eligibility for the National Register of identified potentially historic resources
- historic resource studies for significant areas
- historic structure reports for all historic structures to be altered
- testing of selected archeological sites
- historic/cultural landscape studies of significant areas

All of these tasks should be conducted in a manner that would meet the secretary of the interior's standards for historic preservation.

The Mid-Atlantic Region has a cooperative agreement with the state of West Virginia, which permits them to transfer funds to the state to conduct this work with the appropriate task orders for specific items. Such a task order is underway for work at Kaymoor. Additional task orders for contexts, surveys, etc. have been discussed with the state and are in the development stages.

RECREATIONAL RESOURCES

Basic information on recreational resources and visitor use came from several documents for New River Gorge National River, including the *General Management Plan*, "Statement for Management," "Interpretive Guide," and the *Canyon Rim Development Concept Study*. Park personnel furnished information on existing, prevalent, and increasing recreational use and provided insight into future visitor needs. The use of local state parks and commercial organizations was also considered in the recreational resource inventory.

DESCRIPTION

River-oriented recreation is the largest arena of visitor use recreation currently available in the New River Gorge area. Recreationists participate in water-based activities ranging from bank fishing to canoeing to running the white-water rapids in a raft. Certain sections of the river are preferred for different sports, with fishing and canoeing conditions more favorable from near Bluestone Dam to Sandstone Falls in the south end of the park and white-water rafting more exciting from Thurmond downriver toward the north end of the park. In between there is a diverse mix of uses depending on river accessibility and gradient. The flatter areas of water attract canoeists, john-boaters, and fishermen, while the steeper, more turbulent rapids areas attract rafters and kayakers.

This boating audience is catered to by commercial outfitters – 23 rafting companies licensed by the state, and two or three canoeing outfitters with growth potential. The number of visitors involved in river recreation varies from year to year, as well as seasonally, depending on the level of river flow and other more nebulous factors. For example, the recent drought radically reduced the number of rafters in 1988, both commercial and private, using the river.

Camping along the river is a popular activity. Fish camps, set up temporarily for overnight bank fishing, are primitive establishments used for short periods of time but frequently occurring in or near the same locations. Another form of primitive camping is practiced by the commercial rafting companies for overnight raft trips down the river. These usually occur at specific or designated locations; no facilities are available, but the distances traveled are established and allow for appropriate time designations for departures and arrivals. Guided fishing trips also camp overnight along the river.

Sandstone Falls, the only NPS-designated camping area, has a two-week limit per stay. Camping and cabins are available at Babcock State Park. There is also camping south of the national river at Bluestone Lake.

Visitor Use Statistics

	1984	1985	1986	1987	1988
Recreation Visits	N/A	263,000	394,000	436,000	400,800
River Use					
Commercial	82,062	85,316	72,631	72,089	48,874
Private	8,348	10,066	4,239	10,533	4,704
Overnight Stays					
Tents	N/A	N/A	935	1,643	1,831
RVs	N/A	N/A	1,538	1,760	1,270
Trail Use					
(Trails opened in 1988)					
Wolf Creek					7,169
Minden					10,653

Rock climbing is a relatively new and rapidly growing recreational pursuit at New River Gorge. The gorge-top cliffs along the north end of the national river offer a challenging variety of climbing terrain and are becoming widely known as the 4-mile wall. Relatively easy access from roads along the east side between Canyon Rim and the Beauty Mountain area and the lengthy stretch of available terrain have contributed to the increasing popularity of this activity.

Scenic drives in the New River Gorge area offer a different perspective of the river. A loop drive around the national river offers a wide variety of scenery and terrain along with a few overlooks into the gorge at the north end and roads paralleling the river at the south end. The bumpy but usually passable McKendree Road adds a scenic stretch along the east gorge wall between Thurmond and Prince. Since the recent opening of I-64 across the gorge and Glade Creek, areas of the national river that were relatively inaccessible are now highly visible to great numbers of passing motorists. With the eventual development of the New River Parkway (I-64 to Hinton) to access the national river from the interstate, increasing numbers of visitors will be able to easily drive through areas of the gorge that could only be reached before by hiking or boating.

The new parkway will provide access to the new southern visitor center, which is planned to replace the temporary center operating in Hinton. Together with the visitor center at Canyon Rim, the southern visitor center dispenses information about the national river and recreational opportunities in the area. The visitor centers offer a variety of park programs, including walking tours of Hinton, canoe instruction, and guided tours.

Nature hiking and bird-watching are popular pursuits in the New River Gorge area. Two trails were officially opened during the 1988 season – the Wolf Creek Trail to Kaymoor and the Minden Trail along an abandoned railroad spur across the river from Thurmond. The Minden Trail is one segment of the Mary Draper Ingles Trail proposed for development along a legendary route from the Ohio River to Blacksburg, Virginia.

Numerous other trails lace the gorge, but these are informal traces used traditionally to reach long-time favorite fishing, camping, or hunting spots. A lengthy trail down the course of Glade Creek leads eventually to the river and connects to other informal trails along the river from below Grandview State Park. These existing informal trails in combination with developed trails are being linked by a trail plan proposed to traverse the length of the gorge. Other trails beginning in Babcock and Grandview state parks may be tied into as well. A limited amount of horseback riding also exists around the north end of the national river. A rental stable offers trail rides in conjunction with raft trips, and there are designated horse trails in Babcock State Park.

Besides the attraction of its scenic nature trail, the entire Glade Creek area provides a wide variety of opportunities for land-based recreation. The Glade Creek drainage encompasses some of the most pristine, least disturbed natural scenery within the national river. Since most of the Glade Creek area is beyond the sights and sounds of railroad tracks, motor vehicles, and other indications of modern civilization, the area offers park visitors opportunities for solitude that are unavailable elsewhere in New River Gorge National River. Some signs of man's past occupancy, such as pieces of split-rail fence or a few daffodils on an early homestead site, abandoned decades ago, are occasionally seen by adventurous hikers. Some activities currently making use of the recreational resources include hiking, bird-watching, fishing, and seasonal hunting.

Hunting is allowed in the national river boundary and must conform to state regulations and seasons for game. Trapping, by NPS legislation, is not allowed within the boundaries. Offroad vehicle use is allowed and quite popular, taking advantage of some of the abandoned railroad grades and logging roads that crisscross much of the area.

Special events that afford extra variety at New River include two steam locomotive trips through the gorge during the fall color season; Whitewater Wednesday, sponsored by the local Chamber of Commerce; and Bridge Day in the autumn that draws large numbers of participants for the various activities involved, including special food and entertainment attractions and the BASE jumpers parachuting off the New River bridge at Fayetteville.

SIGNIFICANT RESOURCES

Recreational opportunity areas include picnic sites, boat launch and river access points, trailheads and trails, and rock-climbing cliffs. The information plotted on the USGS topographic quads and transferred digitally to the GIS data system was then combined in the computer with natural, scenic, and cultural resource information and printed out as resource data overlays for use with the 7-1/2 minute USGS topographic maps. Because developed activities and recreational facilities are somewhat limited at New River, all existing recreational areas, including the river itself, have been designated the highest level of significance for the purposes of this report.

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As the nation's principal conservation agency, the Department of the Interior has basic responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

Publication services were provided by the graphics and editorial staffs of the Denver Service Center. NPS D-29A, July 1989

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DATE FILMED

03/20/92